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The 23-Foot Indoor Antenna

Make an effective 20 and 80 meter apartment-dweller antenna.

by Richard Q. Marris G2BZQ

Relocating into an apartment for the first time can have a very traumatic effect. This, of course, also applies to any other habitation where an HF outdoor antenna is not permitted or is physically impossible to erect.

This first happened to me (licensed for too many years to remember how many) when, over 30 years ago, new employment meant moving the QTH at regular intervals, and turned me into an apartment dweller. Since then I've tried and evolved many apartment antenna types, including loops and helicals.

My Solution

With just 23 feet of wire across a room, it is possible to quickly get onto 20 and 80 meters in a minimum of time and at minimum cost.

In each successive QTH move, the good old 23 feet of wire has always been used first, to get G2BZQ back on the air again within a few hours of taking up the new residence.

Figure 1 shows the 20 meter version, and Figure 2 that for 80 meters. Note that the same 23 feet of wire (A-B) is used for both bands. Assuming that your transceiver can be placed in the corner of a room, A-B will consist of a drop down of about four feet to your rig, and the remaining 19 feet will be hung horizontally diagonally across the room, at least 9" below the ceiling. White PVC covered stranded hookup wire (#22 gauge—Radio Shack #278-1218) should be used as it is inconspicuous against a white ceiling. It should be supported by nylon fishing line which is also inconspicuous.

This antenna should be kept away from electrical wiring, water pipes, etc. Terminate with a small plastic ring at point B, leaving about 2" of bare wire hanging down. Support the plastic ring to the room corner with 10 lbs. breaking strain nylon fishing line. At the other corner of the room, support the wire to that corner with fishing line, leaving a drop down at A (about four feet), which is near the transceiver. This is the 23-foot antenna!

For 20 Meters

See Figure 1. As an antenna wire is increased in length above 1/4 wavelength long, the terminal impedance increases to a point where the impedance reaches 50 ohms. Unfortunately, at the same time the reactance has also increased, but can be tuned out with a series capacitor (C in Figure 1a). This variable capacitor should be a good quality ceramic type, of equivalent size to that in your transmitter's PA. It should be mounted in a plastic box with a large diameter plastic instrument knob. Coaxial socket SKT1 can be connected to a 50-ohm output having a pi network output, using a short length of RG58 feedline. Better still, an existing 20 meter antenna tuner (ATU) can be inserted between SKT1 and the rig. This will help eliminate TVI.

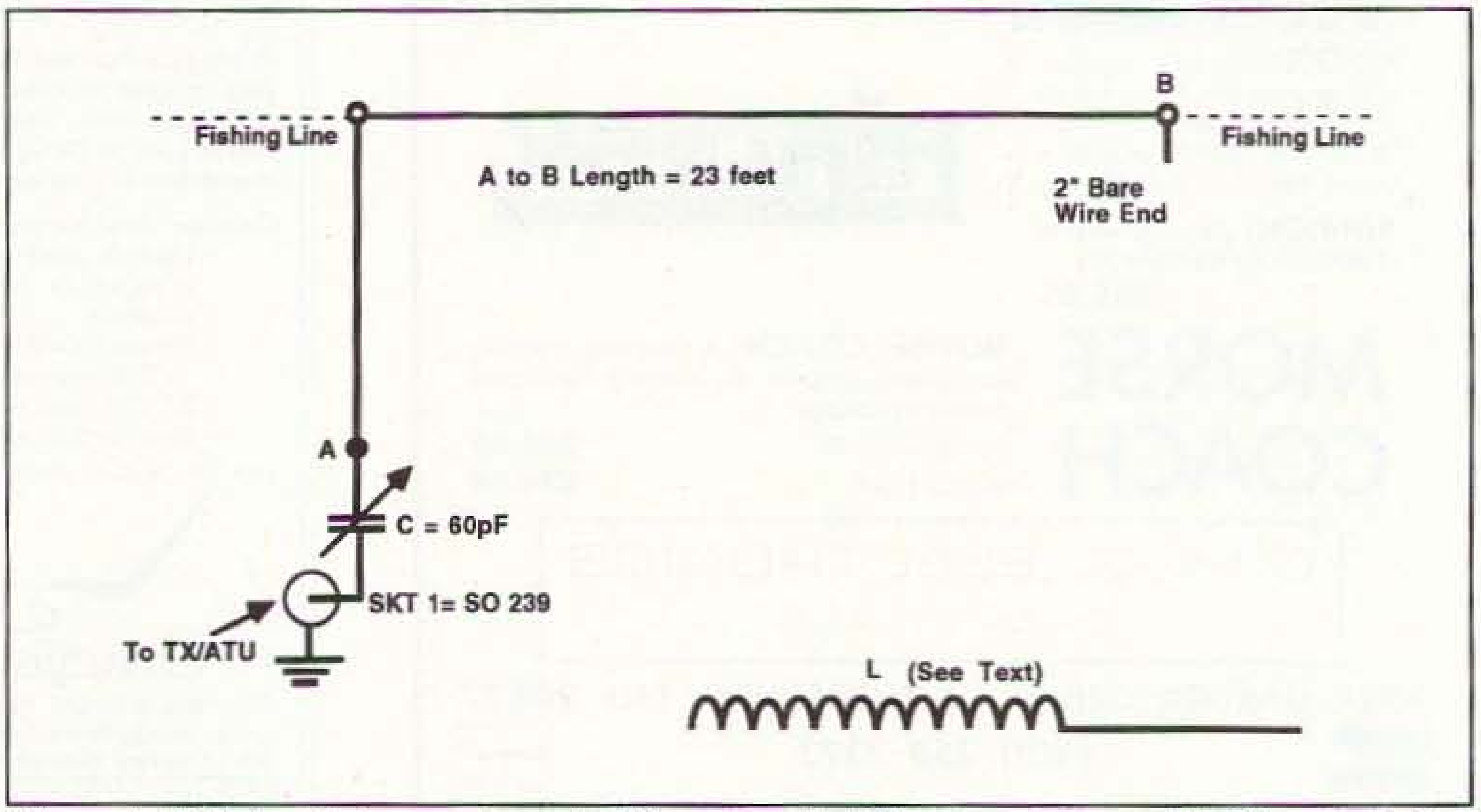

Figure 1. A 23-foot indoor antenna for 20 meters: 1a) 20 meter antenna; 1b) 20 meter helical ground.

For 80 Meters

Figure 2 shows that the same 23 feet of wire is used for 80 meters, with the addition of a vertical end helical coil L2 which, in fact, is a combined loading coil and radiating element added to the end of the 23-foot wire (A-B).

Using 22' 6" of the same PVC covered wire, wind 21 feet helically on a 1/2" diameter wood dowel or plastic tube, spacing the turns over a width of 3' 8". A tail of 18" will be left at the top end and, fitted with a strong clip, it can be attached to the main antenna wire at point B. It will be necessary to fit a suitable wood base to hold L2 vertically.

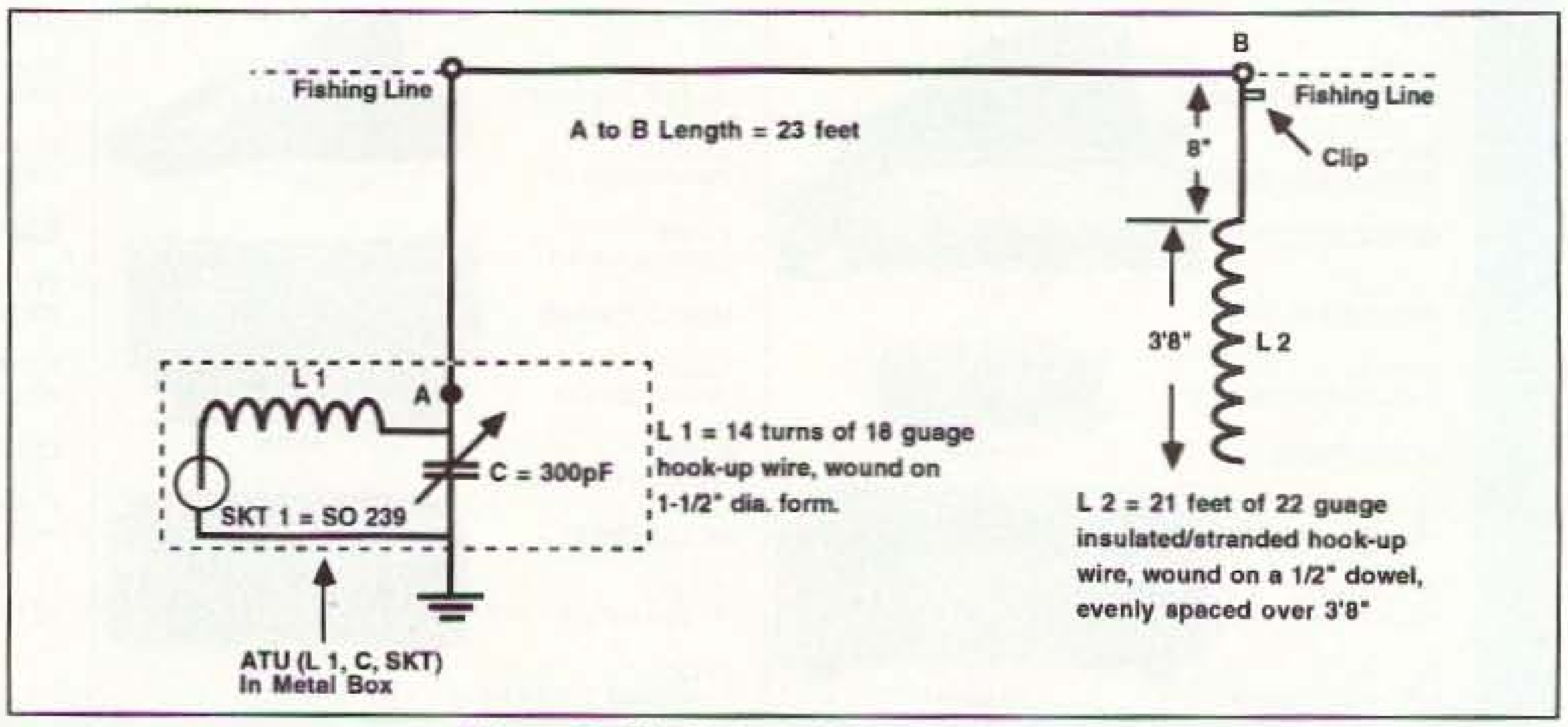
Fishing Line
B
Fishing Line
A to B Length = 23 feet
8"
Clip
3'8"
L2
L1
A
C = 300pF
SKT 1 = SO 239
L 1 = 14 turns of 18 guage hook-up wire, wound on 1-1/2" dia. form.
L 2 = 21 feet of 22 guage insulated/stranded hook-up wire, wound on a 1/2" dowel, evenly spaced over 3'8"
ATU (L 1, C, SKT) In Metal Box

Figure 2. The indoor 80 meter antenna.

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At the transmitter end of the antenna wire, a simple LC ATU matches the antenna to your rig. The ATU should be built into a metal box. L1 consists of 14 close-wound turns of 18-gauge enamel copper wire, wound on a 1.2" diameter PVC form. L1 should be mounted in the metal box with at least a coil diameter of clearance away from metal work. C1 should be a good quality variable capacitor of 300 pF capacity, or even 500 pF.

The simple ATU consists of L1 + C + SKT1, in a metal box. *However*, an existing good LC, "T" or other ATU, could be used in place of the one shown.

Wire length A-B, plus the vertical helical section L2, form the radiating antenna. L2 should be mounted vertically and fitted with a wood base to support it—it should be at least 15" clear of walls, etc.

Ground Systems for 20 and 80 Meters

Ground connections are an ongoing problem with the indoor antenna. If there is a *metal* water pipe close to the TX, then a short wire stout flex can be clipped to it to form a ground. Do not connect to a plastic water pipe, gas pipes or electric wiring conduit. On 20 meters, the connecting lead should not exceed about six feet, and on 80 meters up to 15/20 feet should be satisfactory.

Figure 1b shows an artificial ground for 20 meters. It consists of 36 feet of PVC covered stranded wire (Radio Shack #278-1218) helically wound around a six-foot length of 5/8" diameter dowel of plastic pipe. The turns should be spaced to fill a length of 5'5" on the dowel. The ends of the winding can be secured with tape. The connecting lead should be four feet long. The artificial ground should not be laid on the floor, but provided with supports at least 24" high and mounted horizontally. Various positions relative to the antenna should be tried for the best results.

I developed an excellent artificial ground for 20/80 meters when living in Minneapolis in the 1970s. The operating position was near a very large metal-framed double-glazed window. A short ground lead was clipped to the metal window frame and proved to be most effective on both 20 and 80 meters. I have since tried this idea at other locations. No doubt it formed a vertical ground plane.

Conclusion

This simple 23-foot antenna gives an apartment dweller a quick and effective way of working on the 20 and 80 meter bands. Of course, the higher the antenna the better the results. I have worked DX on 20 meters using both 10 and 100 watts CW, and up to about 3,000 miles on 80 meters. However, in the interests of domestic safety and TVI elimimation, a low power TX is suggested-no more than 20 watts.

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